

CHAPTER 1 -- INTRODUCTION

BACKGROUND

This report documents the methods and technical criteria used by staff of the South Florida Water Management District (SFWMD or District) to develop minimum flows and levels (MFLs) for the Northwest Fork of the Loxahatchee River.

The District Water Management Plan (DWMP) for South Florida (SFWMD, 2000a) includes a schedule for establishing MFLs for priority water bodies within the District. Section 373.042(2), Florida Statutes (F.S.), requires the water management districts to annually review this list and schedule and make any necessary revisions. This list identified the need to establish MFLs for the Loxahatchee River and Estuary. The Minimum Flows and Levels Priority List and Schedule was modified in November 2001 and the deadline for establishing these criteria and associated rule development was extended to December 2002 (letter from Henry Dean, SFWMD to David Struhs, FDEP dated October 16, 2001 -- see **Appendix Q**).

These MFLs are being developed pursuant to the requirements contained within the "Florida Water Resources Act," specifically Sections 373.042 and 373.0421, F.S., as part of a comprehensive water resources management approach geared towards assuring the sustainability of the water resources. The proposed MFLs are not a "stand alone" resource protection tool, but should be considered in conjunction with all other resource protection responsibilities granted to the water management districts by law. This includes consumptive use and environmental resource permitting, water shortage management and water reservations. A model framework identifying the relationship between these tools is discussed in this document and was used in developing the MFLs. In addition, the SFWMD has completed Regional Water Supply Plans pursuant to Chapter 373.0361 F.S., which also include recommendations for establishment of minimum flows and recovery and prevention strategies (SFWMD 2000b, 2000c and 2000d).

Establishing *minimum* flows and levels alone will not be sufficient to maintain a sustainable resource or protect it from significant harm during the broad range of water conditions occurring in the managed system. Setting a minimum flow is viewed as a starting point to define water needs for sustainability. The necessary hydrologic regime for restoration of the Loxahatchee River and Estuary ecosystem must also be defined and implemented through regional water supply plans, the use of water reservations and other water resource protection tools.

For the Loxahatchee River and Estuary, periodic large volume freshwater flows also impact the resource. *Maximum* flows for the Loxahatchee River and Estuary occur when excess storm water is discharged to tide by the operation of Canal C-18 through structures G-92 (Northwest Fork) and S-46 (Southwest Fork) and the South Indian River Water Control District's Canal 14 (C-14).

The Florida Department of Environmental Protection (FDEP) and the SFWMD have initiated a separate process to develop a restoration plan for the Loxahatchee River and Estuary. This effort will not only identify the amount of flow required to protect this system from harm but will identify seasonal flow requirements for the river and estuary, and maximum amounts of flow that can be sustained by this system without causing damage to the resource. This restoration effort will be used as input to the ongoing Comprehensive Everglades Restoration Plan (CERP) effort in northern Palm Beach and southern Martin Counties (USACE and SFWMD 1999). Achieving the required flows and water levels throughout the Loxahatchee River and Estuary is a long term component of CERP.

As a first formal step to establish MFLs for the Loxahatchee River and Estuary, this report includes the following:

- Description of the framework for determining MFLs based on best available information (this approach may be applied to other surface and ground waters within the District).
- Development of a methodology and technical criteria as a basis for establishing MFLs for the Northwest Fork.
- Supporting data and analyses.

This document received independent scientific peer review pursuant to Section 373.042, F.S. and rule development workshops were held to discuss concepts proposed for the Northwest Fork of the Loxahatchee River. Persons who wish to receive notice of future workshops, other public meetings and results of the scientific peer review process, should notify the District.

PROCESS AND BASES FOR ESTABLISHMENT OF MINIMUM FLOWS AND LEVELS

Process Steps and Activities

The process for establishing minimum flows for the Northwest Fork of the Loxahatchee River can be summarized as follows:

1. Through the development of the Lower East Coast Regional Water Supply Plan, the Northern Palm Beach County Comprehensive Water Management Plan and concurrent staff research and analysis, a methodology and technical basis for establishment of the MFLs was developed.
2. An initial draft of the MFL technical criteria document was completed in February 2001.
3. A technical workshop was conducted to review the initial draft, and the draft was revised to incorporate comments received from the public and various agencies. A revised draft was released in May 2001.
4. Scientific peer reviews of the technical documents were conducted in July of 2001 to verify the criteria pursuant to Section 373.0421, F.S.

5. Revisions to the MFL report, as recommended by the peer review panel, were incorporated into the criteria. A revised draft of the technical report was completed in July 2002 and sent to the peer review panel, the public and other agencies for additional comments, which have been incorporated into this document.
6. Further public consideration of the technical basis and methodology for establishing the MFLs and review of the first draft of the rule will be conducted during rule development workshops, beginning in November 2002.
7. A final rule will be presented to the Governing Board for adoption in December 2002.

Legal and Policy Bases for Establishment of Minimum Flows and Levels

Florida law requires the water management districts to establish MFLs for surface waters and aquifers within their jurisdiction (Section 373.042(1), F.S.) The minimum flow is defined as the "... limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area." The minimum level is defined as the "... limit at which further withdrawals would be significantly harmful to the water resources of the area" (Section 373.042(1), F.S.) The statute further directs water management districts to use the best available information in establishing the MFL. Each water management district must also consider, and at its discretion may provide for, the protection of non-consumptive uses in the establishment of MFLs (Section 373.042, F.S.) In addition, a baseline condition for the protected resource functions must be identified through consideration of changes and structural alterations in the hydrologic system (Section 373.042(1), F.S.).

The following sections outline the legal and policy factors relevant to establishing MFLs under the MFL law. In summary, the following questions are addressed:

- A. What are the priority functions of each water resource and what is the baseline condition for the functions being protected?
- B. What level of protection for these functions is provided by the MFL standard of protection, significant harm?

Identify Relevant Water Resource Functions

Each surface water body or aquifer serves an array of water resource functions. These functions must be considered when establishing a MFL as a basis for defining significant harm.

The term "water resource" is used throughout Chapter 373. Water resource functions protected under Chapter 373 are broad, as illustrated in Section 373.016, F.S., which includes flood control, water quality protection, water supply and storage, fish and wildlife protection, navigation and recreation.

The State Water Resource Implementation Rule, Section 62-40.405, F.A.C, outlines specific factors to consider, including protection of natural seasonal changes in water flows or

levels, environmental values associated with aquatic and wetland ecology and water levels in aquifer systems. Other specific considerations include:

- Fish and wildlife habitat and the passage of fish
- Maintenance of freshwater storage and supply
- Water quality
- Estuarine resources
- Transfer of detrital material
- Filtration and absorption of nutrients and pollutants
- Sediment loads
- Recreation in and on the water
- Navigation
- Aesthetic and scenic attributes

This policy determination as to which resource functions to consider in establishing MFLs is within the Governing Board's purview. This analysis requires a comprehensive look at sustainability of the resource itself as well as its role in sustaining overall regional water resources. **Chapter 3** of the MFL document provides a detailed description of the relevant water resource functions of the Loxahatchee River and Estuary.

Identify Considerations and Exclusions: Baseline Conditions to Protect Water Resource Functions

Once the water resource functions to be protected by a specific minimum flow or level have been defined, the baseline resource conditions for assessing significant harm must be identified. Considerations for making this determination are set forth in Section 373.0421(1)(a), F.S., which requires the water management districts when setting a MFL, to consider changes and structural alterations that have occurred to a water resource. Likewise, Section 373.0421(1)(b), F.S., recognizes that certain water bodies no longer serve their historical function and that recovery of these water bodies to historical conditions may not be feasible. These provisions are discussed in **Chapter 3**, to examine their applicability to the minimum flows that are proposed for the Northwest Fork of the Loxahatchee River.

Level of Protection for Water Resource Functions Provided by the MFL Standard of *Significant Harm*

The overall purpose of Chapter 373 is to ensure the sustainability of water resources of the state (section 373.016, F.S.). To carry out this responsibility, Chapter 373 provides the District with several tools with varying levels of resource protection standards. MFLs play one part in this framework. Determination of the role of MFLs and the protection that they offer, versus other water resource tools available to the District, is discussed below.

The scope and context of MFLs protection rests with the definition of significant harm. The following discussion provides some context to the MFLs statute, including the significant harm standard, in relation to other water resource protection statutes.

Sustainability is the umbrella of water resource protection standards (Section 373.016, F.S.). Each water resource protection standard must fit into a statutory niche to achieve this overall goal. Pursuant to Parts II and IV of Chapter 373, surface water management and consumptive use permitting regulatory programs must prevent **harm** to the water resource. Water shortage statutes dictate that permitted water supplies must be restricted from use to prevent **serious harm** to the water resources. Other resource protection tools include reservation of water for fish and wildlife, or health and safety (Section 373.223(3), F.S.) and aquifer zoning to prevent undesirable uses of the ground water (Section 373.036(4)–(5), F.S.). By contrast, MFLs are set at the point at which **significant harm** to the water resources, or ecology, would occur. The levels of harm cited above -- harm, significant harm and serious harm -- are relative resource protection terms, each playing a role in the ultimate goal of achieving a sustainable water resource. The SFWMD has proposed that the conceptual relationship among the terms harm, significant harm, and serious harm can be represented as shown in **Figure 1**.

		<u>Water Resource Protection Standards</u>	<u>Observed Impacts</u>
Water levels/flow decreasing	Permittable Reservation of Water	NO HARM (1-in-10 level of certainty)	Normal Permitted Operation/ Environmental Restoration
	Phase I Water Shortage Phase II Water Shortage	HARM	Temporary loss of water resource functions taking 1 to 2 years to recover
Drought severity increasing	MINIMUM FLOWS & LEVELS	SIGNIFICANT HARM	Water resource functions require multiple years to recover
	Phase III Water Shortage	SERIOUS HARM	Permanent, irreversible, or long-term loss of water resource functions
	Phase IV Water Shortage		

Figure 1. Conceptual Relationships Among the Terms Harm, Significant Harm and Serious Harm

The general narrative definition of significant harm proposed by the SFWMD (Chapter 40E-8.021(24), Florida Administrative Code (F.A.C.)) for the water resources of an area is as follows:

“Significant Harm – means the temporary loss of water resource functions, which result from a change in surface or ground water hydrology, that takes more than two years to recover, but which is considered less severe than serious harm. The specific water resource functions addressed by a MFL and the duration of the recovery period associated with significant harm are defined for each priority water body based on the MFL technical support document” (Chapter 40E-8.021(24), F.A.C.)

Other Levels of Harm Considered in Florida Statutes

A discussion of the other levels of harm identified in the conceptual model for consumptive use permitting and water shortage is provided below to give context to the proposed significant harm standard.

Consumptive Use Permitting Role - Harm Standard

The resource protection criteria used for Consumptive Use Permitting (CUP) are based on the level of impact that is considered harmful to the water resource. These criteria are applied, to various resource functions, to establish the range of hydrologic change that can occur without harm. The hydrological criteria include level, duration and frequency components and are used to define the amount of water that can be allocated from the resource. Saltwater intrusion, wetland draw-down, aquifer mining and pollution prevention criteria in Chapter 40E-2, F.A.C., together define the harm standard for purposes of consumptive use allocation. These harm criteria are applied using climate conditions that represent an assumed level of certainty. The level of certainty used in the Lower West Coast, Lower East Coast and Upper East Coast Regional Water Supply Plans (SFWMD 2000b, 2000c and 2000d) is a 1-in-10 year drought frequency, as defined in the District's permitting rules. The 1-in-10 year drought level of certainty is also the water supply planning goal that was established in Section 373.0361, F.S. The standard for harm used in the CUP process is considered as the point at which adverse impacts to water resources can be restored within a period of one to two years of average rainfall conditions. These short-term adverse impacts are addressed for the CUP program, which calculates allocations to meet demands for use during relatively mild, dry season events, defined as the 1-in-10 year drought.

Water Shortage Role - Serious Harm Standard

Pursuant to Section 373.246, F.S., water shortage declarations are designed to prevent serious harm from occurring to water resources. Serious harm, the ultimate harm to the water resources contemplated under Chapter 373, F.S., can be interpreted as long-term, irreversible or permanent impacts. Declaration of water shortages is the tool used by the Governing Board to prevent serious harm. These impacts associated with serious harm occur at drought events that are more severe than the 1-in-10 level of drought used in the CUP criteria.

When drought conditions exist, water users increase withdrawals to supplement water not provided by rainfall, typically for irrigation or outside use. In general, the more severe the drought, the more supplemental water is needed. These increased withdrawals increase the potential for serious harm to the water resource.

The SFWMD has implemented its water shortage authority by restricting consumptive uses based on the concept of equitable distribution between users and the water resources (Chapter 40E-21, F.A.C.). Under this program, different levels or phases of water shortage restrictions are imposed relative to the severity of drought conditions. The four phases of the current water shortage restrictions are based on relative levels of risk posed to resource conditions leading up to serious harm impacts. Under the SFWMD's program, Phase I and Phase

II water shortages are primarily designed to prevent harm, such as localized, but recoverable, damage to wetlands or short-term inability to maintain water levels needed for restoration. Actions that may be taken include reducing water use through conservation techniques and minor use restrictions, such as car washing and lawn watering. Phases III and IV, however, require use cutbacks that are associated with some level of economic impact to users, such as agricultural irrigation restrictions.

MFL RECOVERY AND PREVENTION STRATEGY

MFLs are implemented through a multifaceted recovery and prevention strategy, developed pursuant to Section 373.0421(2), F.S. A MFL recovery and prevention strategy is presented in **Chapter 6** of this document.

Section 373.0421(2), F.S., provides that if it is determined that water flows or levels will fall below an established MFL within the next 20 years or that water flows or levels are presently below the MFL, the water management district must develop and implement a recovery or prevention strategy. The twenty-year period should coincide with the regional water supply plan horizon for the area and the strategy is to be developed in concert with that planning process.

The general goal of the recovery and prevention strategy is to take actions to achieve the MFL criteria while continuing to provide sufficient water supplies for all reasonable-beneficial demands. If the existing condition of the resource is below the MFL, recovery to the MFL must be achieved "as soon as practicable." Many different factors influence the water management district's ability to punctually implement proposed actions, including funding availability, detailed design development, permissibility of regulated actions, land acquisition and implementation of updated permitting rules.

From a regulatory standpoint, depending on the existing and projected flows or levels, either water shortage triggers, interim consumptive use permit criteria, or both, may be recommended in the recovery and prevention strategy. The approach varies depending on whether the MFL is currently exceeded or not, and depending on the cause of the MFL exceedance, e.g., consumptive use withdrawals, poor surface water conveyance facilities or operations, over drainage, or a combination of the above.

Incremental measures to achieve the MFL must be included in the recovery and prevention strategy, as well as a timetable for the provision of water supplies necessary to meet reasonable beneficial uses. Such measures include development of additional water supplies and conservation and other efficiency measures. These measures must make water available "concurrent with, to the extent practical, and to offset, reductions in permitted withdrawals, consistent with ...[Chapter 373]." The determination of what is "practical" in identifying measures to concurrently replace water supplies will likely be made through consideration of economic and technical feasibility of potential options. Additional information about the recovery and prevention strategy recommended for the Northwest Fork of the Loxahatchee River is provided in **Chapter 6**.

DOCUMENT STRUCTURE

The next section of this report, **Chapter 2**, describes the geographic setting, the resources at risk and major issues concerning the use and conservation of resources within the Loxahatchee River and Estuary.

Chapter 3 describes resource functions, considerations and exclusions for the Loxahatchee River and Estuary.

Chapter 4 documents the methods that were used to establish significant harm criteria for the different areas, resources and functions.

Results of analyses and the specific hydrologic criteria developed to indicate the point at which significant harm occurs are described in **Chapter 5**, including an analysis of the specific relevant factors and implications of the proposed definition of significant harm. **Chapter 5** also presents conclusion and recommendations.

Chapter 6 includes the recovery and prevention strategies for the Northwest Fork of the Loxahatchee River, description of research needs and the literature cited.

Appendices A through **J, N, P** and **R** are provided, in separate volumes, and include technical information, such as descriptions and analysis of methods and tools, supplemental data and analyses, literature and results of the peer review. **Appendices K** through **M, O, Q** and **S** present supplemental information that was used to support this plan, including results of the peer review, related correspondence, laws, rules and other activities in the watershed.